CR-91 Event – Shelby County, AL
Preliminary Air Monitoring Summary
September 19, 2016 05:00

Prepared by
Center for Toxicology and Environmental Health, L.L.C. (CTEH®)
On Behalf of Colonial Pipeline

5120 Northshore Drive ■ North Little Rock, AR 72118 ■ (p) 501.801.8500 www.cteh.com
Toxicology Emergency Response 24-Hour Help Desk 1.866.869.2834

Introduction

On September 9, 2016, the Center for Toxicology and Environmental Health, L.L.C. (CTEH®) initiated air monitoring in support of response efforts to the gasoline release in Shelby County, AL. This report presents the real-time air monitoring data recorded from September 18 2016 17:00 to September 19, 2016 05:00 CDT.

Real-Time Air Monitoring[1]

Real-time air monitoring was conducted to evaluate the potential airborne presence of gasoline-associated constituents, if any, during response operations. All instrumentation was calibrated at least once per day or per manufacturer's recommendations. Target analytes were measured as total volatile organic compounds (VOCs), oxygen, benzene, and flammability as the percent of the lower explosive limit (LEL) using remote telemetering RAESystems® AreaRAEs, hand-held instruments such as RAESystems® MultiRAE Pro/Plus' and UltraRAEs, as well as Gastec® colorimetric detection tubes.

During this monitoring period, four benzene, one LEL and 13 VOC action level exceedances were recorded during worker activity monitoring, including instantaneous VOC and benzene readings which were recorded above the action level. When necessary, workers egressed the area in accordance with the approved sampling and analysis plan.

Table 1, below, presents the results of real-time air monitoring using hand-held instruments. Maps of the incident site location and locations of hand-held real-time air monitoring readings are provided in Appendix I.

[1] *Real-time air monitoring refers to the use of hand-held instruments that provide near-instantaneous readings of an airborne chemical concentration without the need for laboratory analysis.*

Table 1: Hand-Held Real-Time Air Monitoring Summary[1]

September 18, 2016 17:00 to September 19, 2016 05:00

Location Category	Analyte	Instrument	Count of Readings	Count of Detections	Range of Detections[2,3]
Worker Activity Monitoring	Benzene	UltraRAE	76	32	0.05 - 6.6 ppm
	%LEL	MultiRAE Plus	27	0	<1 %
		MultiRAE Pro	163	1	7 - 7 %
	VOCs	MultiRAE Plus	26	11	0.4 - 12.8 ppm
		MultiRAE Pro	176	118	0.1 - 440 ppm
	Xylene	Gastec #123	1	0	<1 ppm
Site Characterization	Benzene	UltraRAE	4	2	6 - 160 ppm
	%LEL	MultiRAE Pro	6	2	4 - 8 %
	VOC	MultiRAE Pro	6	6	0.9 - 4999.9 ppm4

[1]Please Note: The data displayed in the above table has not undergone complete QC analysis and is presented in a preliminary format.
[2]Maximum detections preceded by the "<" symbol are considered non-detections below the instrument limit of detection (LoD) value to the right.
[3]Numbers are the raw values, no correction factors have been applied.
[4]VOC sensor upper detection limit for the MultiRAE Pro is 5000 ppm.

During this monitoring period remote telemetering equipment recorded 2235 detections of VOCs above the CTEH established action level of 30 ppm and 3 detections of LEL above the CTEH established action level of 10% (3% as raw values on LEL sensors).

Table 2 (below) summarizes remote telemetering AreaRAE data for this monitoring period. For this reporting period AreaRAE monitoring data may contain drift events[2]. Appendix I and Appendix II include location maps and graphs for remote telemetering data, respectively. [4]

[2] Drift is defined as any interference in the PID's or electrochemical sensor's ability to accurately report the concentration of a chemical in the atmosphere. Humidity, rapid temperature changes, and compromised batteries are examples of common sources of drift.

Table 2: Remote Telemetering Real-time Air Monitoring Summary[1,3]

September 18, 2016 17:00 to September 19, 2016 05:00

Unit	Location Description	Analyte	Count of Readings	Count of Detections	Range of Detections[2]
AR01	2A Compressors	LEL	2761	22	1.1 - 4 %
		O_2	2761	2761	20.9 - 20.9 %
		VOC	2761	2672	0.1 - 302.1 ppm
AR04	2A Frac Tank Staging	LEL	2761	0	<1 %
		O_2	2761	2761	20.9 - 21.3 %
		VOC	2761	2581	0.1 - 70.9 ppm
AR05	2A Recovery	LEL	2743	0	<1 %
		O_2	2743	2743	20.9 - 20.9 %
		VOC	2743	2681	0.1 - 63.7 ppm
AR06	East of Release Site/Near Stopple 2	LEL	2814	0	<1 %
		O_2	2814	2814	20.9 - 22 %
		VOC	2814	2631	0.1 - 87 ppm
AR07	2B Recovery	LEL	2827	0	<1 %
		O_2	2827	2827	20.9 - 20.9 %
		VOC	2827	2336	0.1 - 23.4 ppm
AR08	Main Staging Area Frac Tanks	LEL	2747	0	<1 %
		O_2	2747	2747	20.9 - 21.3 %
		VOC	2747	2024	0.1 - 44.2 ppm
AR09	Release Site	LEL	2740	12	1.2 - 4.9 %
		O_2	2740	2740	20.5 - 20.9 %
		VOC	2740	1906	0.1 - 107.9 ppm
AR10	On path between Recovery 2A and Recovery 2B.	LEL	2784	0	<1 %
		O_2	2784	2784	20.9 - 21.2 %
		VOC	2784	2760	0.1 - 99.9 ppm
AR11	Main Staging Entrance East of TRG checkpoint	LEL	2726	0	<1 %
		O_2	2726	2726	20.9 - 20.9 %
		VOC	2726	973	0.1 - 18.4 ppm
AR12	Boom Site #2	LEL	2503	0	<1 %
		VOC	2503	301	0.1 - 1.5 ppm
AR13	TRG Checkpoint 2 - access to stopple 1, Recovery 2A and 2A Frac Tank Staging Area.	LEL	2684	0	<1 %
		O_2	2684	2684	20.9 - 20.9 %
		VOC	2684	1114	0.1 - 13.1 ppm
AR14	Cab of excavator at release site	LEL	2739	0	<1 %
		O_2	2739	2739	20.9 - 20.9 %
		VOC	2739	2607	0.1 - 55.5 ppm

[1]*Please note: The data displayed here has not undergone complete QA/QC analysis and is presented in a preliminary format.*

[2]*Maximum detections preceded by the "<" symbol are considered at the limit of detection (LoD) value to the right.*

[3]*LEL and VOC values are raw values, correction factors have not been applied.*

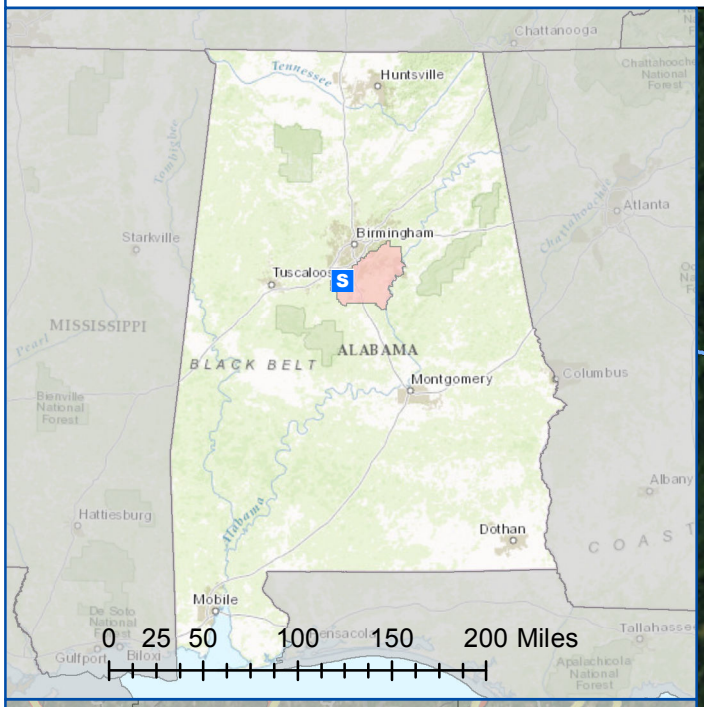
Appendix I:

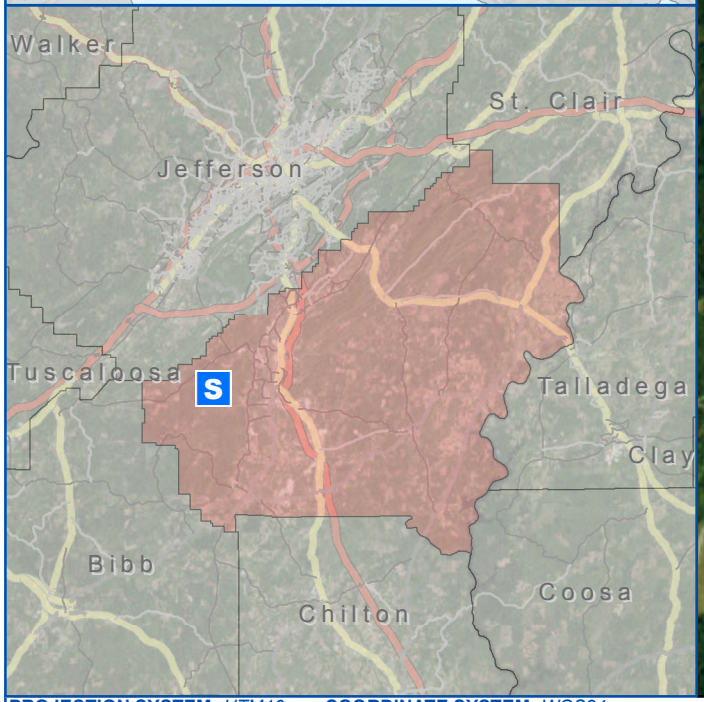
Site Location, Hand-Held Real-Time Air Monitoring Location, and Remote Telemetering Air Monitoring Location Maps

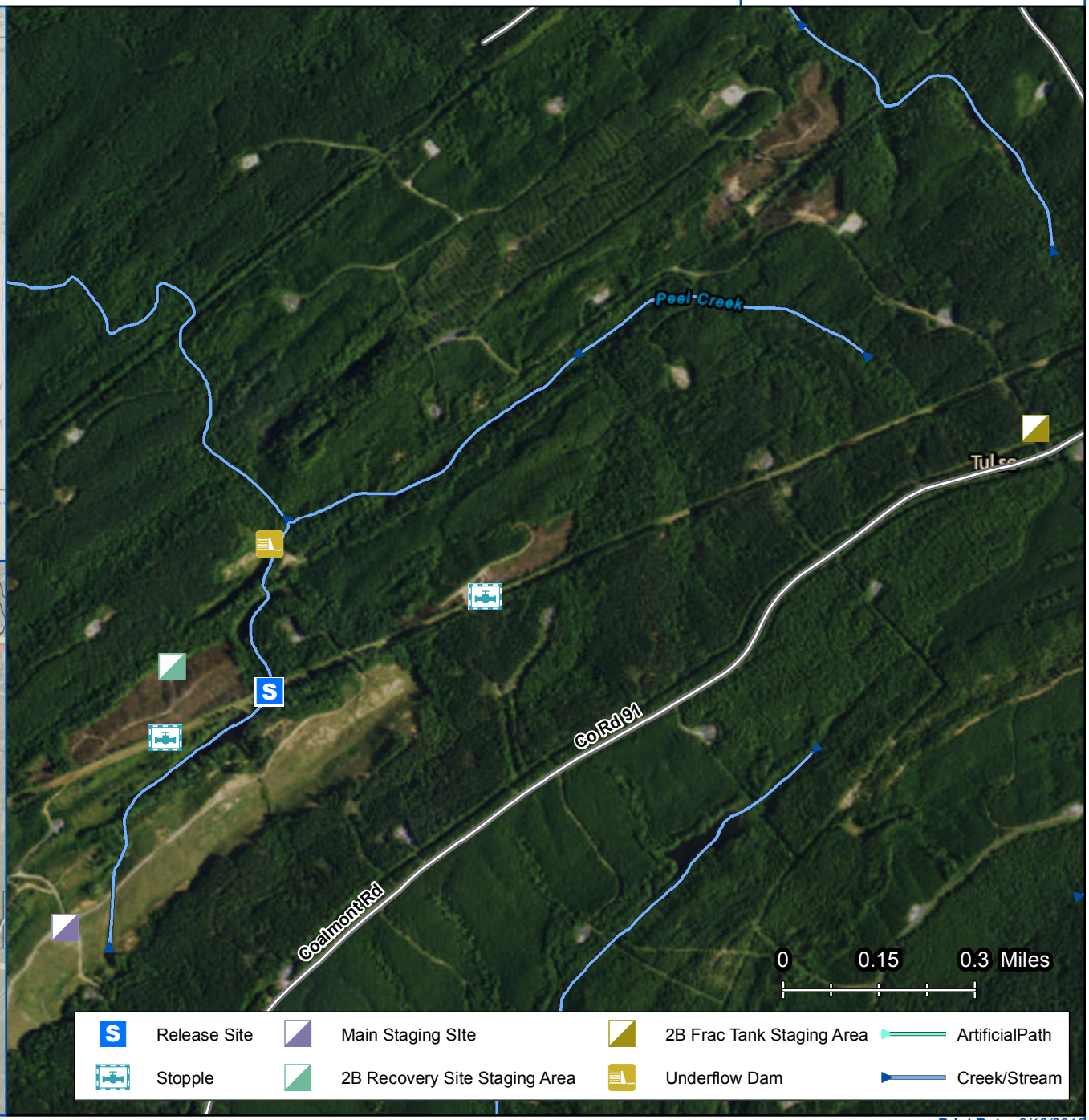
CR-91 Event

Site Location

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL





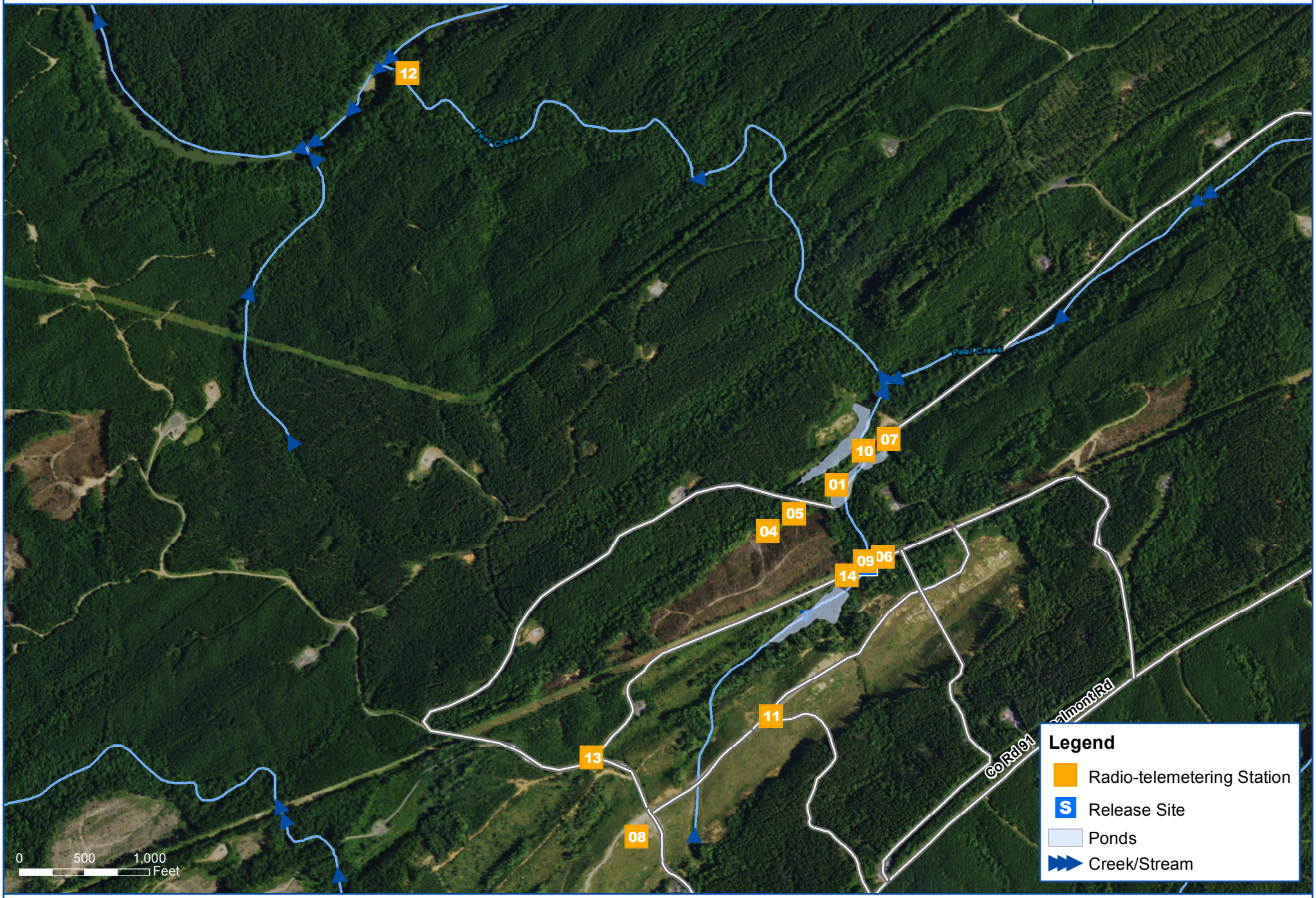


PROJECTION SYSTEM: *UTM16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/13/2016*

Radio-telemetering Real-time Air Monitoring Station Locations

CR-91 Event 9/18/2016

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, LA



PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/18/2016*

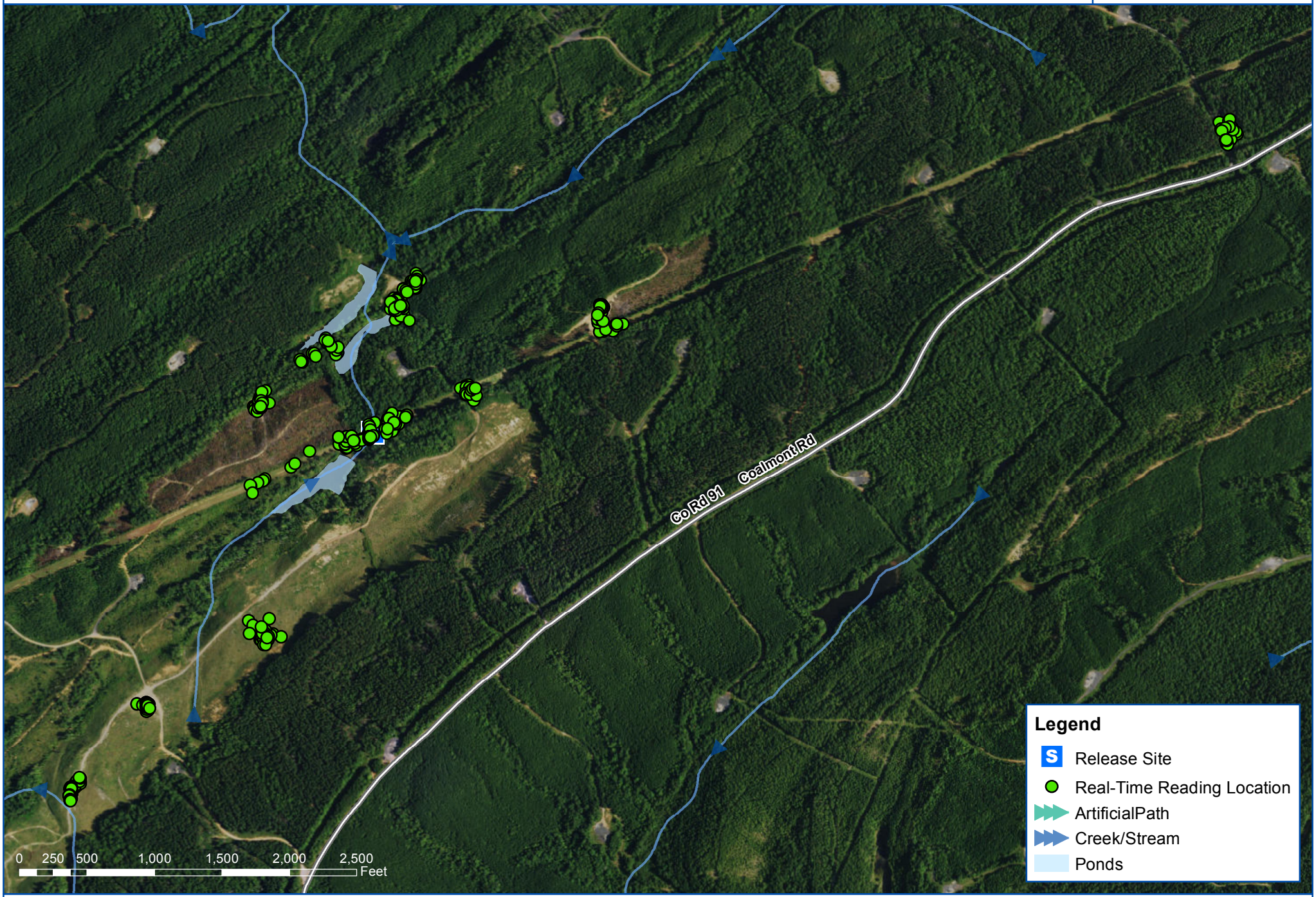
Appendix II:

Remote Telemetering Air Monitoring Graphs

Manually-Logged Real-Time Reading Locations

CR-91 Event | 09/18/2016 17:00 – 09/19/2016 05:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



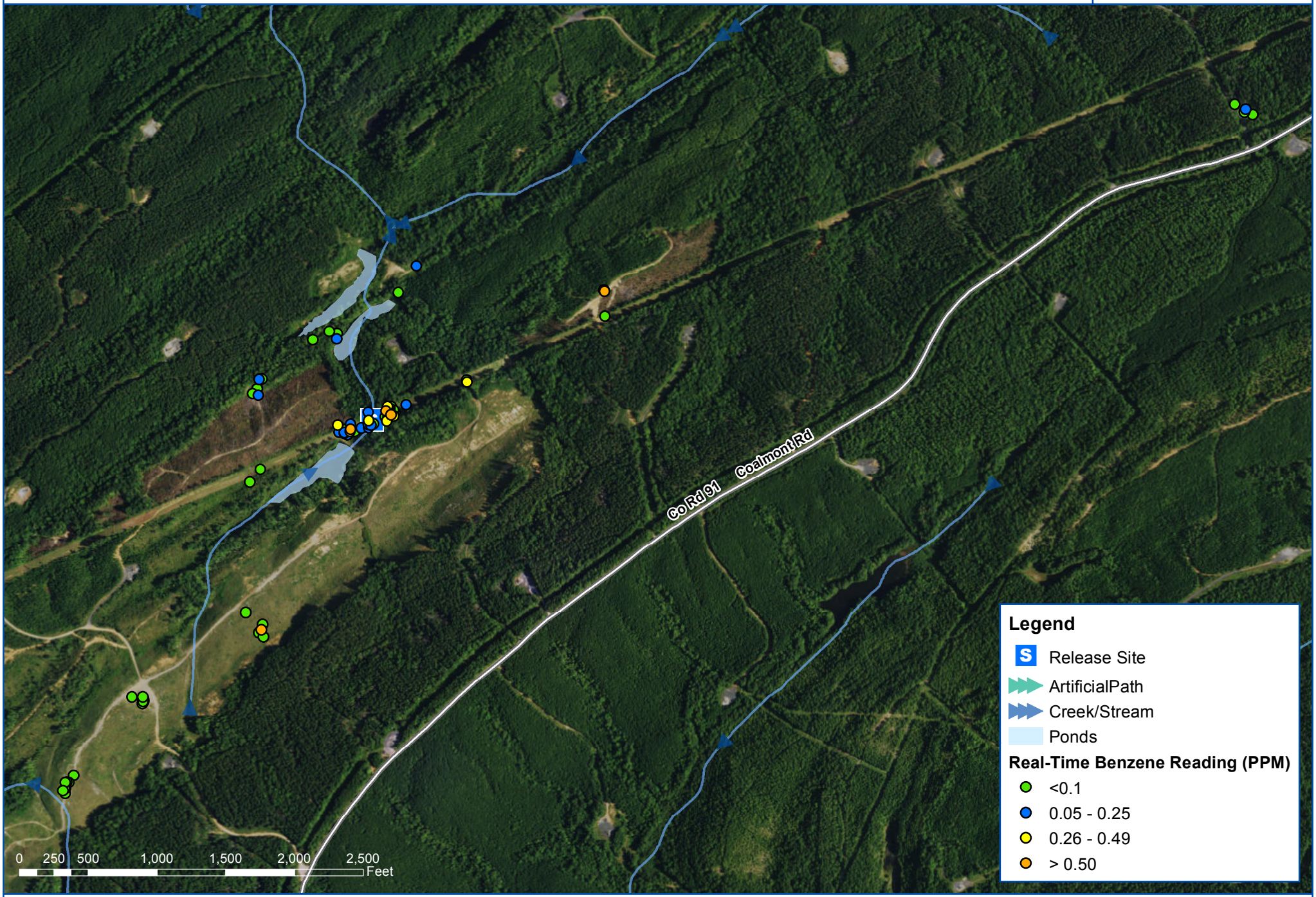
PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/19/2016*

**GPS coordinates are approximate*

Manually-Logged Real-Time Readings | Benzene

CR-91 Event | 09/18/2016 17:00 – 09/19/2016 05:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



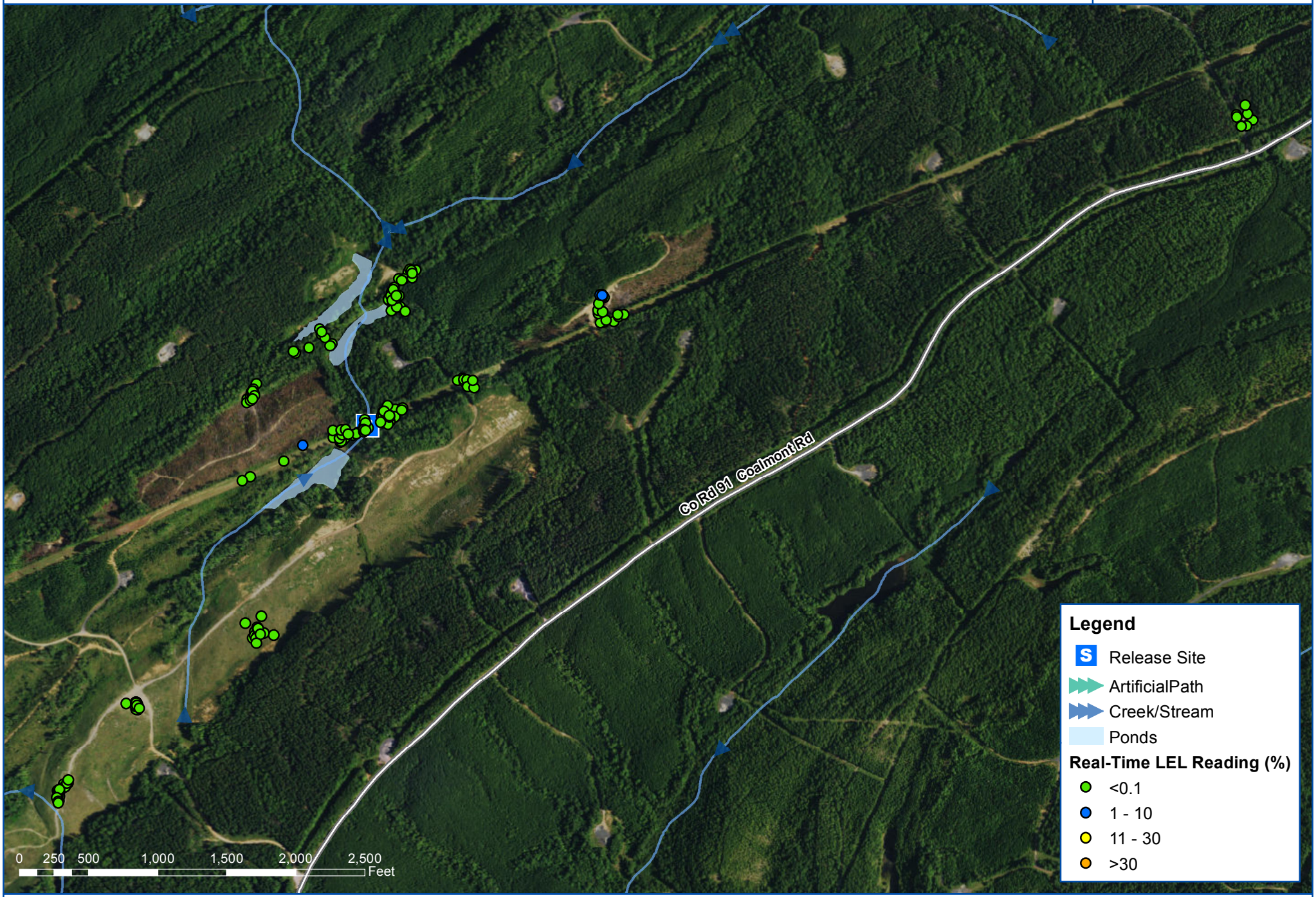
PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/19/2016*

**GPS coordinates are approximate*

Manually-Logged Real-Time Readings | LEL

CR-91 Event | 09/18/2016 17:00 – 09/19/2016 05:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



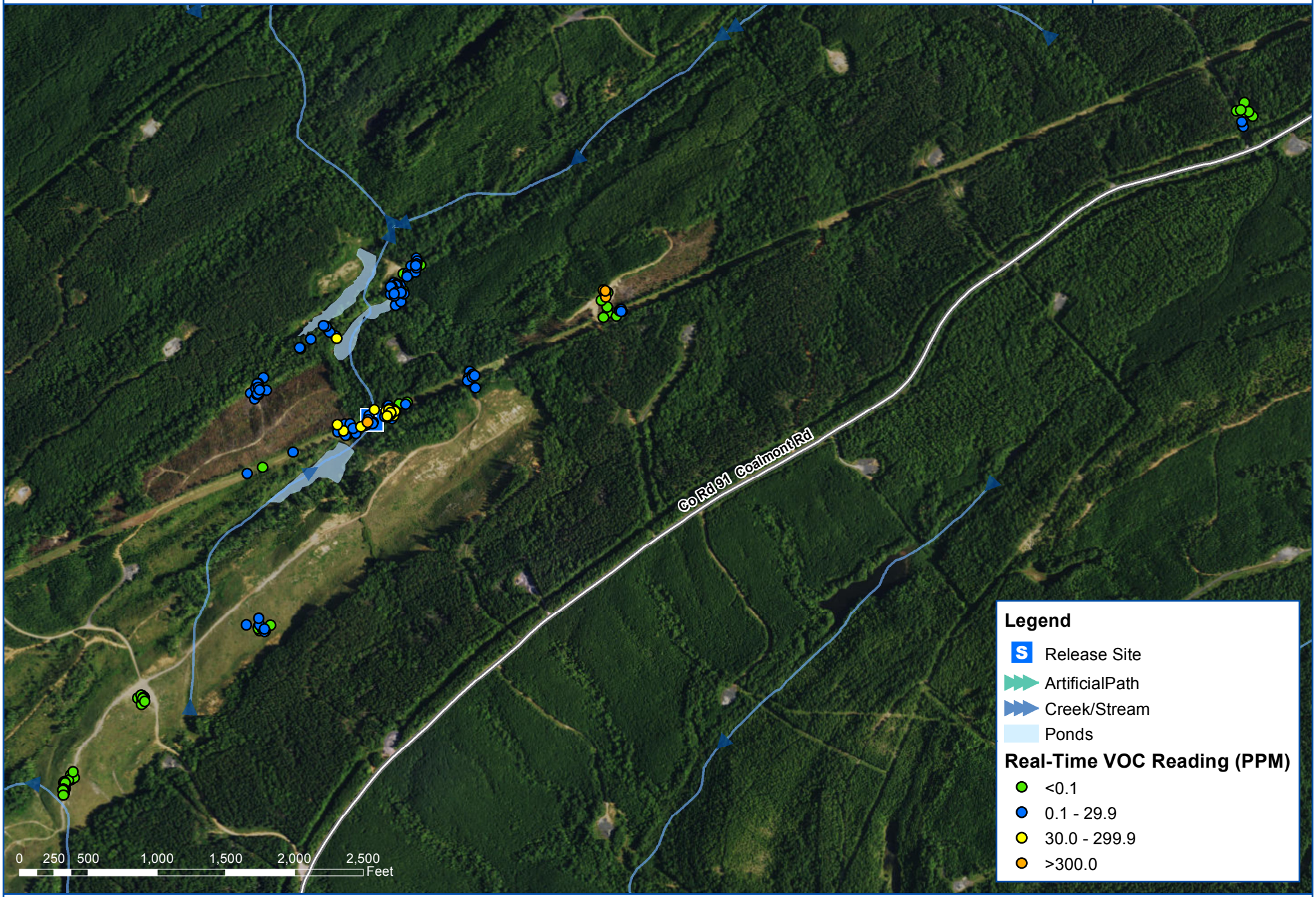
PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/19/2016*

**GPS coordinates are approximate*

Manually-Logged Real-Time Readings | VOC

CR-91 Event | 09/18/2016 17:00 – 09/19/2016 05:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



PROJECTION SYSTEM: *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/19/2016*

**GPS coordinates are approximate*